AMENDMENTS TO THE CLAIMS

1. (Currently Amended) An imaging method using shear waves for observing a diffusing viscoelastic medium ~~(2)~~ containing particles ~~(5)~~ that reflect ultrasound compression waves, said method comprising:

a) an excitation step during which an elastic shear wave is generated in the viscoelastic medium ~~(2)~~;

b) an observation step during which the propagation of the shear wave is observed simultaneously at a multitude of points in an observation field in the viscoelastic medium ~~(2)~~, this observation step comprising the following substeps:

b1) causing an array of transducers ~~(6)~~ that are controlled independently of one another to emit into the viscoelastic medium ~~(2)~~ a succession of unfocused ultrasound compression wave shots at a rate of at least 500 shots per second; and

b2) causing sound signals received from the viscoelastic medium ~~(2)~~ to be detected and recorded in real time, said signals comprising the echoes generated by the unfocused ultrasound compression wave interacting with the reflecting particles ~~(5)~~ in said viscoelastic medium; and

c) at least one processing step during which:

c1) the sound signals received successively from the viscoelastic medium ~~(2)~~ during substep b2) are processed in order to determine successive propagation images of the shear wave; and

c2) at least one movement parameter of the viscoelastic medium ~~(2)~~ is determined at different points of the observation field;

the method being characterized in that during excitation step a) the elastic shear wave is caused to be generated by causing at least one focused ultrasound wave to be emitted into the viscoelastic medium ~~(2)~~ by said array of transducers ~~(6)~~, the focusing and the timing of said focused ultrasound wave, and the timing of said unfocused ultrasound wave being adapted so that at least some of said unfocused ultrasound waves penetrate into the observation field while the shear wave is propagating in the observation field, for at least some of the unfocused ultrasound wave emissions.

2. (Currently Amended) A method according to claim 1, in which during substep b2), in order to determine said movement parameter, a plurality of successive propagation images are compared with a common reference image of the viscoelastic medium ~~(2)~~, the reference image being determined by firing at least one unfocused ultrasound compression wave into said viscoelastic medium and then detecting and recording echoes generated by said unfocused ultrasound compression wave on interacting with the reflecting particles ~~(5)~~ in the viscoelastic medium.

3. (Currently Amended) A method according to claim 2, in which step a) is preceded by an initial observation step a0) during which at least one unfocused ultrasound compression wave is fired and then echoes generated by said unfocused ultrasound compression wave interacting with the reflecting particles ~~(5)~~ in the viscoelastic medium are detected and recorded, said echoes corresponding to an initial image of the viscoelastic medium, and during substep b2), said initial image constitutes said reference image for processing at least some of the successive displacement images.

4. (Currently Amended) A method according to claim 3, in which, during initial observation step a0), a plurality of unfocused ultrasound compression waves are

fired in succession and then echoes generated by each unfocused ultrasound compression wave interacting with the reflecting particles ~~(5)~~ of the viscoelastic medium are detected and recorded, said echoes corresponding to a plurality of successive images of the viscoelastic medium, and said initial image of the viscoelastic medium is determined by combining said successive images.

5. (Currently Amended) A method according to ~~any preceding~~ claim 1, in which said movement parameter is a displacement of the viscoelastic medium ~~(2)~~.

6. (Currently Amended) A method according to ~~any preceding~~ claim 1, in which the focused ultrasound wave emitted during excitation step a) presents a frequency f lying in the range 0.5 MHz to 15 MHz, and is emitted for a duration of k/f seconds, where k is an integer lying in the range 50 to 5000 and f is expressed in Hz.

7. (Currently Amended) A method according to ~~any one of claims 1 to 5~~ claim 1, in which the focused ultrasound wave emitted during excitation step a) presents a frequency lying in the range 0.5 MHz to 15 MHz and is emitted during a succession of emission periods separated by rest periods, the emission periods following one another at a rate lying in the range 10 to 1000 emissions per second.

8. (Currently Amended) A method according to ~~any one of claims 1 to 5~~ claim 1, in which the focused ultrasound wave emitted during excitation step a) is a linear combination (in particular a sum) of two monochromatic signals having respective frequencies f1 and f2 such that $20 \text{ Hz} \leq |f1 - f2| \leq 1000 \text{ Hz}$.

9. (Currently Amended) A method according to ~~any preceding~~ claim 1, in which the focused ultrasound wave emitted during excitation step a) is focused simultaneously on a plurality of points.

10. (Currently Amended) A method according to ~~any preceding~~ claim 1, in which image processing step c) is followed by a mapping step d) during which, on the basis of variation in the movement parameter over time, at least one shear wave propagation parameter is calculated at at least some points of the observation field in order to determine a map of said propagation parameter in the observation field.

11. (Currently Amended) A method according to ~~any preceding~~ claim 1, in which the shear wave propagation parameter which is calculated during mapping step d) is selected from shear wave speed, shear modulus, Young's modulus, shear wave attenuation, shear elasticity, shear viscosity, and mechanical relaxation time.

12. (Original) A method according to claim 11, in which steps a) to d) are repeated successively while emitting different focused ultrasound waves during successive excitation step a), and then combining the maps obtained during the successive mapping step d) in order to calculate a combination map of the observation field.

13. (Currently Amended) Imaging apparatus for implementing a method according to ~~any preceding~~ claim 1 using shear waves to observe a diffusing viscoelastic medium ~~(2)~~ containing particles ~~(5)~~ that reflect ultrasound compression waves, the apparatus comprising an array of transducers ~~(6)~~ that are controlled independently of one another by at least one electronic central unit ~~(4, CPU)~~ adapted:

- to cause at least one elastic shear wave to be generated in the viscoelastic medium ~~(2)~~;

- to observe the propagation of the shear wave simultaneously at a multitude of points in an observation field in the viscoelastic medium ~~(2)~~ by causing said array of transducers ~~(6)~~ to emit into the viscoelastic medium a succession of unfocused ultrasound compression wave shots at a rate of at least 500 shots per second, then causing said array of transducers ~~(6)~~ to detect in real time and to record in real time sound signals received from the viscoelastic medium ~~(2)~~, the sound signals comprising the echoes generated by the unfocused ultrasound compression wave interacting with the reflecting particles ~~(5)~~ of said viscoelastic medium; and

- processing the successive sound signals received from the viscoelastic medium ~~(2)~~ to determine successive propagation images of the shear wave, and then determining at least one movement parameter of the viscoelastic medium ~~(2)~~ at different points of the observation field;

the apparatus being characterized in that the electronic central unit ~~(4)~~ is adapted to cause the elastic shear wave to be generated by causing at least one focused ultrasound wave to be emitted into the viscoelastic medium by said array of transducers ~~(6)~~, the focusing and the timing of said focused ultrasound wave, and the timing of said unfocused ultrasound wave being adapted so that said unfocused ultrasound waves reach the observation field during the propagation of the shear wave through the observation field.